

10/689289

Cofc



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July 15, 2008

Commissioner for Patents
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ATTN: Certificate of Corrections Branch

*Certificate
of Correction
JUL 22 2008*

RE: U.S. Patent No. 7,395,657

Dear Sir,

Attached find a Certificate Of Correction (PTO/SB/44) for the above named patent. Please make the noted corrections. Thank you.

Sincerely,


Steven J. Rosen
Patent Attorney of Record
29,972

SJR/ksp

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RECORDED MAILING - CERTIFICATE OF MAILING NO. 00000000000000000000000000000000

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James Edward Johnson

Case No.: 133476

Serial No.: 10/689,289 : : Patent No.: 7,395,657

Filed: 10/20/2003 : : Issued: 07/08/2008

For: FLADE GAS TURBINE ENGINE WITH FIXED GEOMETRY INLET

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT

Attached in duplicate is Form PTO/SB/44 identifying two corrections that are necessary as a result of printing errors in the above-identified patent. The necessary corrections are also noted below.

In the Specification

In column 3, after line 10 and before line 11, please add the following heading:

DETAILED DESCRIPTION OF THE INVENTION

In the Claims

In column 18, Claim 64, line 17, please change "FIJADE" to --FLADE--

In support of this Request, attached are copies of the pages from the patent with the errors highlighted.

Please send the Certificate of Correction to the Attorney of Record at the address below.

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7/15/08

Date of Signature

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

Page 1 of 1

PATENT NO. : 7,395,657

APPLICATION NO.: 10/689,289

ISSUE DATE : July 8, 2008

INVENTOR(S) : James Edward Johnson

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

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In column 18, Claim 64, line 17, please change "FIJADE" to --FLADE--

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JULY 22 2008

2008
PUBLICATION

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Steven J. Rosen, Patent Attorney
4729 Cornell Rd.
Cincinnati, OH 45241

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

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Page 1 of 1

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Patent Publication

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FIG. 5 is a schematical cross-sectional view the engine in FIG. 3 with a single expansion ramp nozzle.

FIG. 6 is a schematical cross-sectional view illustration of a FLADE aircraft gas turbine engine with a single direction of rotation fan section connected to the fixed geometry inlet duct in FIG. 1.

FIG. 7 is a schematical cross-sectional view illustration of an exemplary embodiment of an aircraft with the fixed geometry inlet duct leading to the FLADE aircraft gas turbine engine as illustrated in FIG. 1.

Schematically illustrated in cross-section in FIGS. 1 and 7 is a supersonic aircraft 10 having a propulsion system 25 that includes a fixed geometry inlet duct 4 leading to an aircraft FLADE engine 1 which is mounted within the aircraft's main body or fuselage 113. The embodiment of the propulsion system illustrated herein further includes a flush mounted supersonic air intake 112 to the fixed geometry inlet duct 4. The air intake 112 is mounted flush with respect to the aircraft's main body or fuselage 113. The fixed geometry inlet duct 4 extends between the air intake 112 and the engine inlet 13. The fixed geometry inlet duct 4 includes a convergent/divergent inlet duct passage 111 for supplying all of the airflow requirements of the aircraft's FLADE engine 1. The convergent/divergent inlet duct passage 111 is illustrated as, but not limited to, a convergent/divergent two-dimensional type having convergent and divergent sections 117 and 119 and a throat 121 therebetween. The fixed geometry inlet duct 4 further includes a transition section 9 between the two-dimensional convergent/divergent inlet duct passage 111 and a round asymmetric engine inlet 13 of the FLADE engine 1. The transition section 9 is shaped to convert the airflow from two-dimensional to asymmetrical airflow. Two types of aircraft FLADE engines 1 are disclosed herein. The first type is a FLADE engine 1 with a counter-rotatable fan having a fan section 115 including first and second counter-rotatable fans 130 and 132 as illustrated in FIGS. 1-3. The fan section 115 in the second type of FLADE engine 1 has only a single direction of rotation fan 330 as illustrated in FIG. 6.

A FLADE engine (FLADE being an acronym for "fan on blade") is one particular type of variable cycle engines characterized by an outer fan driven by a radially inner fan and discharging its FLADE air into an outer fan duct which is generally co-annular with and circumscribes an inner fan duct circumscribing the inner fan. One such engine, disclosed in U.S. Pat. No. 4,043,121, entitled "Two Spool Variable Cycle Engine", by Thomas et al., provides a FLADE fan and outer fan duct within which variable guide vanes control the cycle variability by controlling the amount of air passing through the FLADE outer fan duct. Other high performance aircraft variable cycle gas turbine FLADE engines capable of maintaining an essentially constant inlet airflow over a relatively wide range of thrust at a given set of subsonic flight ambient conditions such as altitude and flight Mach No. in order to avoid spillage drag and to do so over a range of flight conditions have been studied. This capability is particularly needed for subsonic part power engine operating conditions. Examples of these are disclosed in U.S. Pat. No. 5,404,713, entitled "Spillage Drag and Infrared Reducing FLADE Engine", U.S. Pat. No. 5,402,963, entitled "Acoustically Shielded Exhaust System for High Thrust Jet Engines", U.S. Pat. No. 5,261,227, entitled "Variable Specific Thrust Turbo-fan Engine", and European Patent No. EP0,567,277, entitled "Bypass Injector Valve For Variable Cycle Aircraft Engines". A FLADE counter-rotatable fan aircraft gas turbine engine is disclosed in U.S. patent application Ser. No. 10/647,881, filed

Aug. 25, 2003, entitled "FLADE GAS TURBINE ENGINE WITH COUNTER-ROTATABLE FANS" which is incorporated herein by reference.

The FLADE fan aircraft gas turbine engine illustrated schematically in FIG. 1 includes the fan section 115 in direct fluid flow communication with the fixed geometry inlet duct 4. At least one row of FLADE fan blades 5 radially extend across a FLADE duct 3 disposed radially outwardly of and circumscribing the fan section 115. The engine inlet 13 includes a fan inlet 11 to the fan section 115 and an annular FLADE inlet 8 to the FLADE duct 3. The FLADE engine 1 with the counter-rotatable fan has a fan inlet 11 leading to first and second counter-rotatable fans 130 and 132. A FLADE fan 2 having at least one row of FLADE fan blades 5 disposed in a FLADE duct 3 through which FLADE airflow 80 is exhausted by the FLADE fan blades 5. The row of FLADE fan blades 5 is disposed radially outwardly of, operably connected to, and driven by one of the first or second counter-rotatable fans 130 and 132.

Referring to FIGS. 1 and 2, the second fan 132 is illustrated as the FLADE fan having a row of FLADE fan blades 5 disposed between an axially forward row of variable first FLADE vanes 6 and an axially aft row of variable second FLADE vanes 7. The second FLADE vanes 7 are illustrated as being variable but may be fixed. The FLADE fan 2 is disposed downstream of an annular FLADE inlet 8 to the FLADE duct 3. The FLADE inlet 8 and the fan inlet 11 in combination generally form the engine inlet 13. Referring more particularly to FIG. 2, downstream and axially aft of the first and second counter-rotatable fans 130 and 132 is a core engine 18 having an annular core engine inlet 17 and a generally axially extending axis or centerline 12 generally extending forward 14 and aft 16. A fan bypass duct 40 located downstream and axially aft of the first and second counter-rotatable fans 130 and 132 circumscribes the core engine 18. The FLADE duct 3 circumscribes the first and second counter-rotatable fans 130 and 132 and the fan bypass duct 40.

One important criterion of inlet performance is the ram recovery factor. A good inlet must have air-handling characteristics which are matched with the engine, as well as low drag and good flow stability. For a given set of operating flight conditions, the airflow requirements are fixed by the pumping characteristics of the FLADE engine 1. During supersonic operation of the engine, if the area of the engine inlet 13 is too small to handle, the inlet airflow the inlet shock moves downstream of the inlet throat 121 and pressure recovery across the shock worsens and the exit corrected flow from the inlet increases to satisfy the engine demand. If the FLADE engine inlet area is too large, the engine inlet 13 will supply more air than the engine can use resulting in excess drag (spillage drag), because we must either by-pass the excess air around the engine or "spill" it back out of the inlet. Too much air or too little air is detrimental to aircraft system performance. The FLADE fan 2 and the FLADE duct 3 are designed and operated to help manage the inlet airflow delivered by the inlet to the fans.

The fan inlet 11 is sized to receive essentially full engine airflow 15 of the engine at full power conditions with the engine inlet 13 essentially closed off by closing the variable first FLADE vanes 6 and the variable second FLADE vanes 7. The engine is further designed and operated to fully open the inlet of the FLADE duct at predetermined part power flight conditions and essentially close it at full power conditions such as take-off.

The core engine 18 includes, in downstream serial axial flow relationship, a core driven fan 37 having a row of core

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49. An aircraft as claimed in claim 48 wherein the fan section includes only a single direction of rotation fan.

50. An aircraft as claimed in claim 48 wherein the fan section is upstream of a fan bypass duct, includes axially spaced apart first and second counter-rotatable fans, and the FLADE fan blades are drivingly connected to one of the first and second counter-rotatable fans.

51. An aircraft as claimed in claim 48 further comprising a row of variable first FLADE vanes disposed axially forwardly of the row of FLADE fan blades.

52. An aircraft as claimed in claim 51 wherein the fan section includes only a single direction of rotation fan.

53. An aircraft as claimed in claim 51 wherein the fan section is upstream of a fan bypass duct, includes axially spaced apart first and second counter-rotatable fans, and the FLADE fan blades are drivingly connected to one of the first and second counter-rotatable fans.

54. An aircraft as claimed in claim 48 further comprising the row of FLADE fan blades disposed between an axially forward row of variable first FLADE vanes and an axially aft row of second FLADE vanes.

55. An aircraft as claimed in claim 48 further comprising: a core engine located downstream and axially aft of the fan, a fan bypass duct located downstream and axially aft of the fan and circumscribing the core engine, and the FLADE duct circumscribing the fan bypass duct.

56. An aircraft as claimed in claim 55 wherein the fan section includes only a single direction of rotation fan.

57. An aircraft as claimed in claim 55 wherein the fan section is upstream of the fan bypass duct, includes axially spaced apart first and second counter-rotatable fans, and the FLADE fan blades are drivingly connected to one of the first and second counter-rotatable fans.

58. An aircraft as claimed in claim 55 further comprising a row of variable first FLADE vanes disposed axially forwardly of the row of FLADE fan blades. 35

59. An aircraft as claimed in claim 55 further comprising the row of FLADE fan blades disposed between an axially forward row of variable first FLADE vanes and an axially aft row of second FLADE vanes.

60. An aircraft as claimed in claim 59 wherein the fan section includes only a single direction of rotation fan.

61. An aircraft as claimed in claim 48 further comprising the fixed geometry inlet duct having a two-dimensional convergent/divergent inlet duct passage with convergent and divergent sections, and a throat therebetween and a transition section between the two-dimensional convergent/divergent inlet duct passage and the engine inlet.

62. An aircraft as claimed in claim 61 wherein the fan section includes only a single direction of rotation fan.

63. An aircraft as claimed in claim 61 wherein the fan section is upstream of a fan bypass duct, includes axially spaced apart first and second counter-rotatable fans, and the FLADE fan blades are drivingly connected to one of the first and second counter-rotatable fans.

64. An aircraft as claimed in claim 61 further comprising a row of variable first FLADE vanes disposed axially forwardly of the row of FLADE fan blades.

65. An aircraft as claimed in claim 64 wherein the fan section includes only a single direction of rotation fan.

66. An aircraft as claimed in claim 64 wherein the fan section is upstream of a fan bypass duct, includes axially spaced apart first and second counter-rotatable fans, and the FLADE fan blades are drivingly connected to one of the first and second counter-rotatable fans.

67. An aircraft as claimed in claim 61 further comprising the row of FLADE fan blades disposed between an axially forward row of variable first FLADE vanes and an axially aft row of second FLADE vanes.

68. An aircraft as claimed in claim 48 further comprising: a variable throat area engine nozzle downstream and axially aft of the core engine, cooling apertures in the centerbody and in a wall of the engine nozzle in fluid communication with the FLADE duct, and afterburners aft and downstream of the low pressure turbine section.

* * * * *